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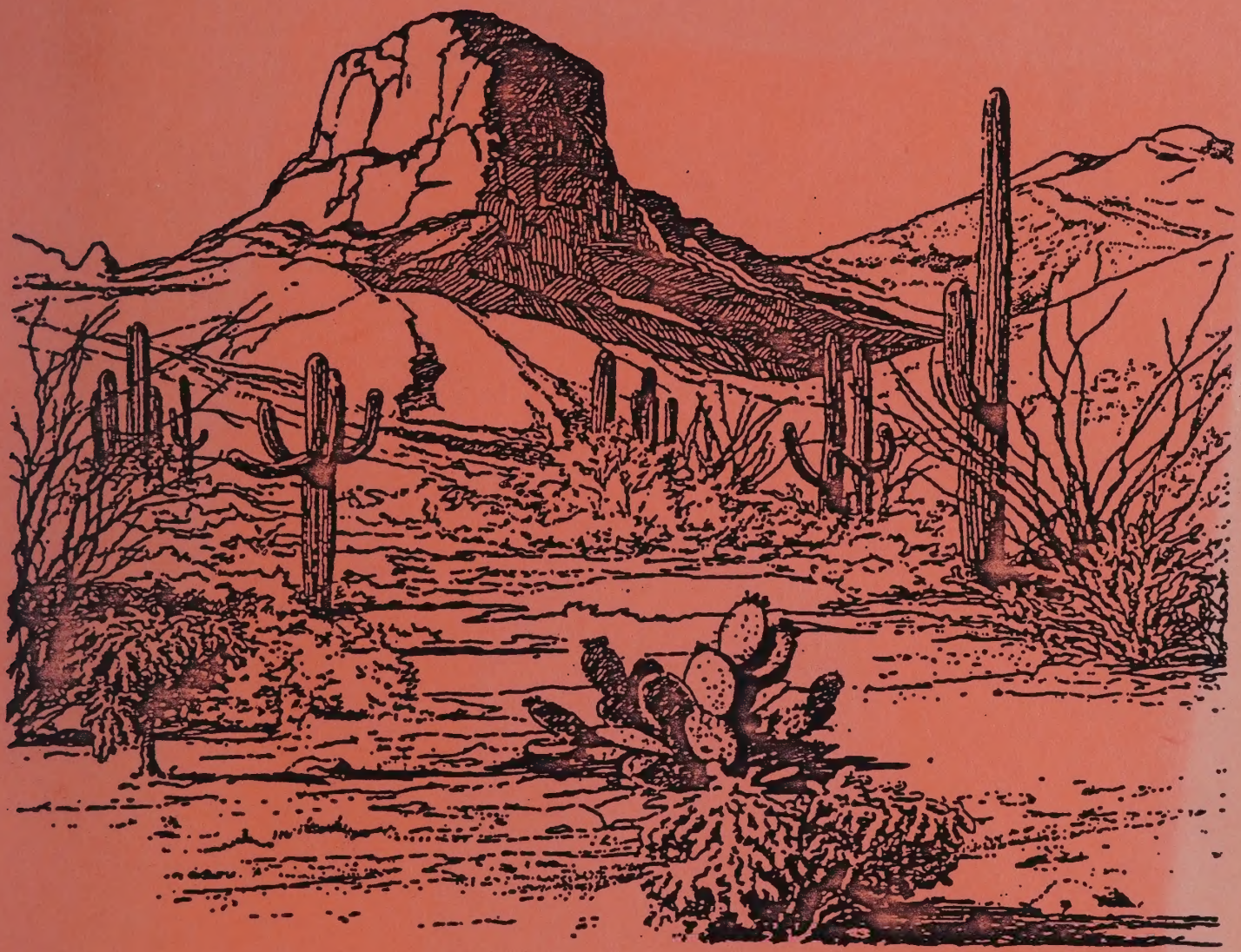
ARIZONA
WILDERNESS FIRE PLANNING HANDBOOK



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I. BACKGROUND.

A. PURPOSE.

This handbook is designed to give the fire manager and the line manager direction on developing the fire management plan for wilderness areas. This is important to ensure consistency in the fire management plans and to ensure that all aspects of managing fire in wilderness areas have been considered once the plan is complete.

B. BACKGROUND.

The Wilderness Act of 1964 was enacted to establish a National Wilderness Preservation System for the good of the whole people. This law defines what wilderness is, how areas are established, what uses can be made in wilderness areas, what uses are prohibited, and outlines special provisions within wilderness areas. The Federal Land Policy and Management Act of 1976 (FLPMA) made wilderness preservation a part of BLM's multiple use mandate. Section 603 of FLPMA outlines how BLM will manage land designated as wilderness. Section 603(c) states in part that:

> "Once an area has been designated for preservation as wilderness, the provisions of the Wilderness Act which apply to national forest wilderness areas shall apply with respect to the administration and use of such designated area..."

The Bureau of Land Management was given 15 years from the enactment of FLPMA to study areas that may qualify as wilderness areas under the Wilderness Act and make recommendations through the Secretary of Interior to the President of the United States. After October 21,1991, the President has two years to report to Congress. Only Congress can designate an area as wilderness.

The primary guidance for management of wilderness administered by BLM is found in BLM Manual 8560 - Management Of Designated Wilderness Areas. BLM Manual 8561 - Wilderness Management Plans, provides policy and instructions for preparing, reviewing, approving, and implementing wilderness management plans, which in turn provide site specific guidance for the development of Fire Management Plans.

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Other Bureau Guidance which is pertinent to Fire Management Planning in wilderness areas includes:

BLM Manual 9200- Protection

BLM Manual 9210- Fire Management

BLM Manual 9211- Fire Planning

BLM Manual 9212- Fire Prevention

BLM Manual 9213- Presuppression

BLM Manual 9214- Prescribed Fire Management

The Bureau's overriding fire guidance is set by Instruction Memorandum 90-221. Section .35A.1 and 2 states:

> "There are only two kinds of fires: prescribed fires and wildfires. Prescribed fire is the planned application of fire burning under specified conditions in a predetermined area to achieve management objectives. Wildfire is an unplanned fire that is burning without a prescription. All wildfires will be suppressed. Suppression actions in the wilderness must be executed to minimize surface disturbance and alterations of the natural landscape and fire suppression costs while being consistent with management objectives and constraints. An Escaped Fire Analysis will be prepared to govern all wildfires that escape the initial attack. Methods and equipment which least alter the landscape or disturb the land surface are considered the best. Suppression structures and improvements must be located outside the wilderness, except those that are the minimum necessary to protect life, property, public welfare and wilderness objectives. Although all wildfires will be suppressed, **the fact that a wildfire occurs in a wilderness is not in itself an emergency.** An emergency exists when a wildfire burning inside a wilderness boundary threatens human life, or property. An emergency also exists when there is a definite potential for a wildfire to exceed suppression efforts and burn beyond the wilderness boundary and endanger either human life, property, managed resources, and the public welfare".

BLM wilderness areas emerge from lands once subject to literally hundreds of land laws and regulations that allowed virtually any use and/or disposal of land. Many of the uses continue today under the provisions of FLPMA. Traditional activities such as grazing are considered non-conforming but acceptable uses in wilderness and, as such, are allowed to continue, albeit,

somewhat constrained. Wilderness areas may also contain activities or uses that continue with a legal standing as a valid existing right, such as a mining operation on a valid claim. Finally, there are the ongoing administrative programs. They do not cease with the designation of wilderness but they do continue with a new set of overriding objectives--the protection and preservation of natural systems and settings.

Historical uses on public lands have, over time, produced subtle effects that have changed how fires behave. Fire behavior in wilderness areas is no exception. Past suppression efforts, livestock grazing, the presence of structures, etc., will influence how fire will be managed within a wilderness for many years to come. In light of all this, fire management in wilderness areas is not a business-as-usual situation. There are many challenges in blending appropriate fire management with the mandate of wilderness preservation.

C. PLANNING PROCESS AND NEPA COMPLIANCE.

The Bureau Planning System is subdivided into three distinct tiers: the policy tier; the RMP tier; and the Activity Plan tier. The policy tier is a Bureau and statewide tier, the RMP tier is the land use plan, and the activity plan tier is the specific plan prepared to carry out RMP decisions. The fire manager is directly involved with the RMP tier and the Activity Plan tier. In the fire management program, the activity tier is represented by the Fire Management Activity Plans and the Operational Plans. Operational plans are considered an additional level of planning which provides specific operational guidance for fire management. **The Wilderness Fire Management plan is unique in that it is a portion of the Wilderness Management Plan (an activity plan) but contains operational guidance (an operational plan).** Specific guidance for each level of planning is found in the relevant planning manual sections (1625, 8561, 9211). The fire manager must be an active participant in the planning process and should consider the following items in each level of planning:

1. Resource Management Plan (RMP): general wilderness management objectives; historic fire occurrence; natural fire occurrence; natural role of fire; and smoke management objectives. The steps in the RMP/EIS process and plan development include:

a. Environmental Analysis.

(1) Identify issues, concerns, opportunities.

(2) Develop criteria.

(3) Data collection.

(4) Analyze the situation.

(5) Formulate alternatives.

(6) Estimate effects.

(7) Evaluate alternatives.

(8) Identify preferred alternatives.

b. Decision.

c. Implement and monitor.

The NEPA compliance document prepared at this level of planning is the Environmental Impact Statement. This document is prepared concurrently with the RMP.

2. Wilderness Management Plans (WMP) and Fire Management Activity Plans (FMAP) contain: specific wilderness management fire-related objectives and constraints; protection standards; prescribed fire objectives; and acceptable control practices and tools which may be used during non-emergencies.

The NEPA compliance document prepared at this level of planning is the Environmental Assessment (EA). The EA is a concise public document that serves to briefly provide adequate evidence and analysis allowing preparation of either a Finding of No Significant Impact (FONSI) or the need for an EIS; show BLM's compliance with NEPA when no EIS is necessary; or, help with the preparation of an EIS when one needs to be prepared.

All EA's must contain a discussion of:

a. The need for the action

b. The proposed action and other alternatives including "no action."

c. The environmental impacts of the proposed action and alternatives.

Note Careful attention should be paid to threatened and endangered species and to cultural resources in analyzing impacts in this section. Instruction Memo AZ-90-52 discusses requirements for cultural resource inventory of prescribed burn areas.

d. A list of agencies and persons consulted.

An EA may be prepared for all actions affecting the human environment except those covered by a categorical exclusion; covered sufficiently by an earlier NEPA compliance document; or, actions for which a decision has already been made to prepare and EIS. The EA must be available for public review.

3. Operational Plans (such as prescribed fire plans and pre-attack plans): site specific information. Daily planning considerations must be made when prescribed fires are in progress. Once a wilderness prescribed fire burns for more than one day, it must be certified by the District Manager on a daily basis to continue to allow it to burn. Daily certification will be based on: (a) the burn being in prescription; (b) there are resources (physical and financial) and management capability available to maintain the fire in prescription throughout its projected life; (c) there are firefighting resources available to provide suppression actions if the fire escapes; and (d) an acceptable overall assessment of the risk that the burn will remain in prescription through projected completion. Without the documented certification that the criteria are being met, the burn will be classified a wildfire and suppressed.

NEPA compliance is handled the same as Activity Plans at this level.

D. PUBLIC NOTIFICATION.

Public notification of a prescribed natural fire should be done as soon as possible. The process of how, when, and who does what could either be outlined in the wilderness fire plan or in a public affairs plan which could cover fire and public awareness over the district as a whole. Such a plan could be referenced in the wilderness fire management plan.

II. DEVELOPING THE WILDERNESS FIRE MANAGEMENT PLAN.

The Bureau will be developing wilderness management plans for a wide variety of ecological types. The role fire plays in the different wilderness areas will be dependent on the attributes and complexity of each particular wilderness area. Fire may play absolutely no role in some wilderness areas while it may be a major force in the maintenance of natural wilderness ecosystems in other wilderness areas. Thus each fire management plan must be tailored to the specific conditions which exist in that particular wilderness area. This makes consistency or standardization in planning across the Bureau very difficult. However, the following outline incorporates factors that should be considered while developing and writing a wilderness fire management plan. The complexity and thoroughness of each section will vary depending on the site specific conditions in a given wilderness area. However each section should be addressed in the plan to ensure that all aspects of planning fire management in wilderness areas are included and to document the fact that they have been considered.

A. GENERAL OUTLINE.

1. Introduction.

2. Objectives for Fire Management in the Wilderness Area.

3. Fire History in the Wilderness Area.

4. Natural Role of Fire.

5. Expected Fire Behavior.

6. Proposed Degree of Suppression.

   a. Actions following the report of a wildfire.

      (1) Suppression.

      (2) Declare the fire a prescribed natural fire.

   b. Management constraints.

7. Acceptable Suppression Techniques.

8. Monitoring and Documentation.

9. Smoke Management.

10. Prescribed Burning.

11. Rehabilitation.

12. Illustrations.

a. Decision matrix.

b. Maps.

B. DESCRIPTION OF PLAN SECTIONS.

1. Introduction. This section should include a brief description of the wilderness area including:

- The location of the wilderness area.
- The size of the wilderness area
- Fuel types within the wilderness area
- Fire weather information about the wilderness area
- The location of any adjacent private land and population centers
- Any special items of consideration such as the presence of riparian areas, level of recreational use, level of archaeological site densities, etc.

Be sure to keep this section brief. The purpose of including it in the fire plan is to give anyone interested in only the fire plan some information about the wilderness area.

2. Objectives for Fire Management in the Wilderness Area. The development of fire management objectives is one of the most important steps in writing the Wilderness Fire Management Plan. The objectives form the foundation for the rest of the plan and must be developed with very careful thought and very close coordination with the wilderness resource specialist and the area and district manager. The objectives are the direct tie between the wilderness management plan and the wilderness fire management plan. Plan objectives should encourage the use of fire in order to meet wilderness objectives and to maintain the wilderness in a more natural state, and to provide fire protection where necessary to protect human life or property.

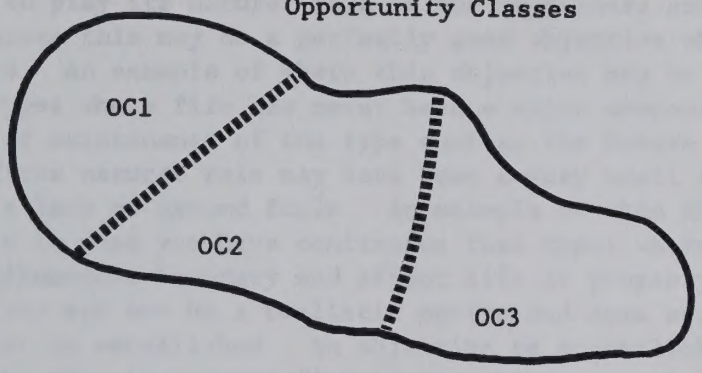
Prior to initiating the Wilderness Fire Management Plan (WFMP), it is very important for the fire manager to become involved in the development of those portions of the WMP that set the direction for fire management in the wilderness. Since the WFMP objectives are derived from the objectives set forth in the WMP, it is imperative that the WMP objectives be realistic, measurable, attainable, and cost effective. Some WMPs will contain, as part of the environmental assessment, various alternative management schemes for

the wilderness. Generally, this should not significantly change the objectives for fire management from one alternative to another unless fire is a major issue; in other words, the WFMP objectives can be tied to the proposed action.

It is likely that some WMPs may contain different sets of objectives for different wilderness settings or zones. The following example depicts various wilderness settings or zones.

Example 1 - WILDERNESS ZONES

The Big Wilderness Area
Opportunity Classes



OC1- Opportunity Class 1-- Untouched by man, few visitors
OC2- Opportunity Class 2-- Pristine areas where recreational use will be encouraged.
OC3- Opportunity Class 3-- Past human uses are still present, majority of visitor use occurs here.

Each of the settings could contain a different objective for fire management. The WMP objectives whether for one zone or many zones, are the origin of the WFMP objectives. The fire manager, in participating in the development of the WMP objectives, can assure that they provide a logical and workable starting point for the WFMP. Many of the wilderness areas we manage may have several fuel types. Each fuel type may have a different fire management strategy. The fuel types when overlaid upon the management settings or zones will show the potential array of objectives which could occur in a particular wilderness area.

It may appear that a wilderness fire management plan is a complex document with many objectives to be considered. This is not necessarily the desired end result. The objective is to develop a comprehensive plan that will achieve or maintain management objectives. In most cases objectives can

be developed which move toward management goals while still being straightforward and attainable.

The only objective developed solely for fire management and an objective that all Wilderness Fire Management Plans must contain is this: Fires that threaten human life or property or would result in unacceptable changes to the wilderness resource, or fires within the wilderness that threaten public welfare or nonwilderness resources outside the wilderness area must be controlled. All other objectives for fire management in wilderness areas will be resource driven. These objectives must be clear and concise and detailed enough to form a basis for implementation of a fire strategy. A common objective that can be found in many wilderness plans is the objective to "allow fire to play its natural role in the wilderness area." In some wilderness areas this may be a perfectly good objective while in others it may be inadequate. An example of where this objective may be appropriate is in vegetation types where fire has never been a major component in the development or maintenance of the type such as the Mohave desert type. In this type, fires natural role may have been a very small fire restricted in size due to a lack of ground fuels. An example of when this objective is inappropriate is when you have continuous fuel types where fire can easily escape the wilderness boundary and affect life or property. In this case "natural" fires may not be a realistic option and some sort of managed fire situation must be established. An objective to accomplish this may be "Emphasize the role of natural fire to control unnatural fuel buildups and allow natural processes to operate without catastrophic wildfire events."

3. Fire History in the Wilderness Area. This section should include a comprehensive history of fire occurrence in the wilderness area. This history should include:

- The number of fires that have occurred in the wilderness area.
- Annual acreage burned in the wilderness area.
- The typical method of ignition (lightning or man-caused).
- Where the fires typically occur in the wilderness area.
- Significant changes in fire occurrence or severity.
- The history of suppression efforts in the wilderness area.

This history should go back in time as far as accurate records will allow. This does not preclude using the early written accounts of explorers/settlers or using the prehistoric (Dendrochronology) records which may be available.

4. Natural Role of Fire. The natural role fire plays in each vegetation type located in the wilderness area should be addressed in this section. It may be as simple as stating that fire has never played a role in ecosystem

functions in the wilderness area (such as many of the desert types) or it may be a complex description of how fire impacts and helps maintain ecosystem functions (such as the ponderosa pine type).

If there have been any human caused changes in how fire functions within a particular vegetation type it should be discussed in this section. Examples of this include areas where past fire suppression efforts have resulted in increased fuel loadings, areas where cheatgrass is establishing itself providing a fine fuel source where none previously existed, areas where livestock grazing has reduced fine fuel sources changing the way in which fire spreads, etc. Any of these factors can change the fire regime in a particular area.

The comparison of the current fire regime with the probable natural fire regime is important in understanding what fire management programs would be appropriate for a given wilderness area. For example, if an area is currently experiencing a typical natural fire regime, a prescribed natural fire program may be suitable. If, however, an area is experiencing something other than its natural regime, a prescribed natural fire program would not be appropriate without mitigating (fuel reduction) measures. Miron Heinselman, Professor, department of ecology and behavioral biology at the University of Minnesota, has developed a scale which characterizes natural fire regimes. It is called the Heinselman Continental Fire Regime scale. It characterizes fire regimes as follows:

0 - No natural fire (or very little).

1 - Infrequent light surface fires (more than a 25 year return interval).

2 - Frequent light surface fires (1 to 25 year return intervals).

3 - Infrequent severe (often high intensity) surface fires (more than 25 year return interval).

4 - Short return interval crown fires and severe surface fires in combination (25 to 100 year return intervals).

5 - Long return interval crown fires and severe surface fires in combination (100 to 300 year return intervals).

6 - Very long return interval crown fires and severe surface fires in combination (over 300 year return intervals).

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The use of a scale such as this one enables the fire manager to categorize an ecosystems current fire regime as compared to its past fire regime in a simple and easily understood way.

This section should also include a description of how fire affects different components of the ecosystems within the wilderness. A good source of information on fire effects on vegetation, wildlife, and ecosystems is the Fire Effects Information System. This system is housed on the MV10000 in Boise and can be accessed with a PC using the Softerm communications software. Information on how to access this information can be obtained by contacting the Boise Interagency Fire Center.

5. Expected Fire Behavior.

a. Evaluation of historic fire behavior. An evaluation of historic fire behavior is important in giving the manager a gauge to determine progress towards achieving the fire management objectives in the wilderness fire plan. A baseline utilizing past fire behavior coupled with weather conditions at the time needs to be discussed in this section. A good way to obtain this information is with the use of the FIREFAMILY program. The three major routines of FIREFAMILY are FIRDAT, SEASON, and FIRINF. In the routine FIRDAT, fire weather station characteristics are combined with daily weather records and the equations of the National Fire-Danger Rating System (NFDRS) to produce frequency distribution tables and graphs of the NFDRS indexes and components. SEASON and FIRINF re-read data created by FIRDAT and organize it into probabilities, seasonal graphs, calendars, and other fire management tools.

These programs can give the fire manager seasonal charts of Burning Index, Energy Release Component, etc. which will be useful in determining if naturally ignited fires may be allowed to burn later on in the plan.

USDA General Technical Report NC-138, FIREFAMILY 1988 describes options within the FIREFAMILY program and explains various tables and graphs necessary for planning. It also provides details on how to run the program.

b. Expected behavior. The fuel models that are to be used in describing the vegetation types present in the wilderness area need to be outlined in this section. Either the NFDRS or NFFL models can be used here. A narrative summary of the characteristics of the fuel model should be included.

The prescription that is developed for the wilderness fire management plan is used primarily as a set of decision criteria on whether to allow a fire to burn as a prescribed natural fire or not. This prescription is the Decision Matrix. In developing prescriptions for prescribed burns ignited by

Bureau personnel the prescription identifies a range of conditions (weather and fuel conditions) which will result in an expected fire behavior. (For the purpose of clarity these will be called environmental prescriptions). This gives the burn boss a "window" in which he/she can burn to accomplish a specific resource objective. (NFFL fuel models are best for this type of prescription development.) The environmental prescription developed for the wilderness fire management plan may be used in deciding if a particular fire will be allowed to burn or whether it will be suppressed. **The outputs of the environmental prescription will describe the expected fire behavior and should be included in this section.**

The type of fire needed to meet management objectives will determine the weather and fuel factors which will be used in the environmental prescription which is developed for each fuel type.

An example of an environmental prescription used in a wilderness area under NFDRS fuel model C is as follows:

Example 2 - PRESCRIPTION

Temperature	< 75°F
Minimum Relative Humidity	> 20 %
10 Hour Fuel Moisture	> 15 %
1,000 Hr. Fuel Moisture	> 20 %
20 ft. Wind Speed	< 10 mph
Live Fuel Moisture	> 130 %

In the example above, note that the 1,000 hour fuel moisture was included as part of the prescription criteria. This is especially important to consider in fuel types that contain 1,000 hour fuels because it gives the manager an idea of what the long term moisture conditions have been. This factor alone can have great impact on fire behavior in the fuel types containing 1,000 hour fuels. Again, the weather and fuel criteria chosen for the prescription should be aimed at achieving the objectives for fire in the wilderness area. For example, can hot fires be tolerated or is the objective to have cool surface fires? Different environmental prescriptions will need to be developed to achieve the desired fire behavior.

The environmental prescription can also be used as a decision threshold. If conditions meet the environmental prescription criteria the fire may be allowed to burn. The environmental prescription can be used in conjunction with the Energy Release Component (ERC) as a part of the decision matrix which is used daily to ensure that all considerations are addressed before a fire is allowed to be declared a prescribed natural fire.

The decision matrix is discussed in more detail in sections IIB.6.a and Illustration A of this handbook.

6. Proposed Degree of Suppression. This section outlines how fires will be managed within the wilderness area to meet management objectives. This section is an action plan that describes the steps that will be taken upon the report of an ignition. This section should also describe how fires will be managed once a decision is made on whether to suppress the fire or declare the fire a prescribed natural fire.

a. Actions following the report of a fire. This section of the plan is used to outline the steps used to determine how to handle a fire once it has been confirmed as being located within the wilderness area. The decision to be made at this point is whether to declare the fire a wildfire or to declare it as a prescribed natural fire. This determination is made using a decision matrix.

Immediately following the report of a fire the environmental prescription or the ERC limits in the decision matrix for the wilderness area will be reviewed. If the environmental prescription or ERC criteria are exceeded, the appropriate suppression forces will dispatched to the fire as outlined in section IIB.7 of the handbook. If the prescription criteria are within limits the District Fire Management Officer and Resource Area Manager will be notified. The Area Manager or his/her designated wilderness resource advisor along with the District Fire Management Officer will review the decision matrix and recommend a course of action to the District Manager. The District Manager will make the decision on what action is to be taken. The District Manager has the authority to override the Wilderness Fire Management Plan at any time if conditions either locally or nationally dictate.

The decision matrix must be reviewed and a decision made on a daily basis as to whether to allow the fire to keep burning or whether to suppress the fire. A more complete discussion on developing the decision matrix can be found in Illustration A of this handbook.

(1) Suppress the fire. This section of the plan includes a general discussion on how suppression actions are authorized and documented in the wilderness file. For example, does the District Manager authorize the use of mechanized equipment on a case-by-case basis or is the authorization approved as a part of the wilderness fire management plan? Is there a different minimum tool which can be used based on the average ERC? Specifics on which type of suppression tools will be used in the wilderness area and when should be included in Section 7 of the Wilderness Fire Management Plan (Acceptable Suppression Techniques).

Wilderness Resource Advisors are not required by Departmental or Bureau Manuals or Directives. It is, however, a very good idea to utilize a Wilderness Resource Advisor. When and how a resource advisor is used should be included in this section. The Wilderness Resource Advisor can provide guidance to the Incident Commander on how actions being contemplated will affect the wilderness resource and can provide alternatives for the Incident Commander to consider.

(2) Declare the fire a prescribed natural fire. This section of the plan details the steps that should be taken once a fire is declared a prescribed natural fire. Once the decision to declare the fire a prescribed natural fire has been made, the following actions should be accomplished:

(a) The District Manager will designate a properly equipped, trained, and suppression qualified prescribed fire manager or tactical prescribed fire team for all fires. The primary job of the prescribed fire manager or team is to monitor the fire as outlined in the monitoring and documentation section of this handbook. Another job of the prescribed fire manager or team is to establish a perimeter for the fire, utilizing existing barriers whenever possible. Any remaining perimeter will be constructed using pre-identified minimum tools. The allowable fire size is dependent on the fuel type in which the fire is burning (this is related to the districts ability to suppress a fire if it goes out of prescription) and the amount of risk the district is willing to take in allowing fire to burn in the wilderness. Establishing a perimeter accomplishes two things.

i. It reduces the amount of time a particular fire will be allowed to burn. If the fire reaches the perimeter in one day the fire will be monitored a shorter period of time than if the fire burned for a month to the same perimeter.

ii. It clears up who will be funding the prescribed burn and when funding goes from benefitting activity to fire suppression. See the section on funding in this handbook.

(b) The State Office and adjoining agencies should be notified by the Logistics Coordinator or Line Manager as appropriate.

(c) The line manager or public affairs officer should activate the public affairs portion of the plan.

(d) The Logistics Coordinator should implement the smoke management portion of the plan.

b. Management constraints. Any type of constraint to fire management in the wilderness area should be addressed in this section. This could include such things as:

- Considerations for Cultural Resource clearance or avoidance.
- Considerations imposed by Threatened or Endangered species.
- Proximity to special use airspace or military training routes.

This is not a complete list of possible constraints. Any other constraints that apply to a particular wilderness area or district should be addressed in this section.

A contingency plan should be developed when a fire is declared a prescribed natural fire and should be updated as changes in fire numbers or situations change.

This portion of the plan is a good place to identify that the District Manager has the authority to override this plan anytime the district fire situation becomes so complex that adequate suppression forces are not available to safely manage a prescribed natural fire.

7. Acceptable Suppression Techniques. Manual 8560 states: "Suppression actions in the wilderness must be executed to minimize surface disturbance and alterations of the natural landscape and fire suppression costs while being consistent with management objectives and constraints. An Escaped Fire Situation Analysis will be prepared to govern all wildfires that escape initial attack. Methods and equipment which least alter the landscape or disturb the land surface are considered best. Suppression structures and improvements must be located outside the wilderness, except those that are minimum necessary to protect life, property, public welfare, and wilderness objectives."

The minimum tool concept must be used. Consideration must be given to the type of suppression equipment that will be the most effective with the least impact on the wilderness resource. In some situations handcrews will have the least impact and still get the job done. In other situations aircraft may be the minimum tool necessary to accomplish the management objectives while least impacting the resource.

An example of how this section could be organized is as follows:

Example 3 - ALLOWABLE SUPPRESSION TECHNIQUES

ERC		Allowable Suppression Action
30-45	Level 1	Crews utilizing handtools, engines restricted to wilderness boundary roads, chainsaw use requires District Manager approval.
46-59	Level 2	Additional items approved in addition to level one include: Aircraft approved for tactical missions only, no landings allowed. Chainsaw use at the discretion of the Incident Commander.
60-78	Level 3	Additional items approved in addition to level two include: Engines approved for off road use within Wilderness on a case-by-case basis.

It is advisable to tie the levels of suppression to existing preparedness plans or to incorporate the levels into any preparedness plan updates. Energy release component is a good criteria to use in this case because it is currently being utilized by cooperating agencies to determine preparedness levels and it is used by other agencies in determining the level at which fires will be declared as prescribed natural fires.

8. Monitoring and Documentation. Monitoring and documenting the effects that prescribed natural fires have on the wilderness ecosystem is important in determining if objectives are being achieved, evaluating the effectiveness of methods, and predicting what effects fire will have in the area in the future. There are two levels of monitoring that should be considered in this section of the plan -- monitoring of the event itself and long term monitoring of the effects the fire has on the wilderness resource. Who will do the monitoring and the level of monitoring proposed should be identified in this section of the plan.

a. Fire Event Monitoring. Monitoring of prescribed natural fires should attempt to gather the following information:

- Estimate of fuel loadings and fuel consumption
- Vegetation changes
- Fire intensity and fire behavior
- Fire weather
- Fire effects
- Smoke Dispersion

How this information will be gathered, analyzed, stored, and used should be included in this section. It is also helpful to obtain photographs and include them as part of the file.

If aerial observations are going to be used to monitor small or extremely inaccessible fires, it may not be possible to collect all of the information listed above. Aerial observers should try to ascertain as much information as possible and write a narrative summary of what was occurring with the fire while they were over it. Notes on anything pertinent can be kept in the aircraft and the narrative completed as soon as the observer is back on the ground. Photographs or even video footage of the prescribed burns from the air would be extremely beneficial.

b. Long-term monitoring. Information about fires' long-term impacts to the wilderness ecosystem can only be obtained through long-term monitoring. The types of long-term monitoring, frequency of monitoring, and who will be responsible for ensuring that monitoring takes place need to be addressed here.

9. Smoke Management. Bureau Manual 9214.33 discusses smoke management. It states:

> The management of smoke and air quality from Bureau initiated prescribed fires will be considered in all phases of prescribed fire planning... Where appropriate, computer models will be used to determine compliance with Federal, State, and local visual and ambient air quality standards. For planning purposes, any residents, facilities used by elderly or the sick, crops, transportation routes, utilities, etc., that could be adversely effected, will be identified in the planning stages and resolved prior to approval of the plan.

Smoke management is becoming a more significant factor in planning prescribed natural fires as clean air standards become more restrictive and the public demands clean air. The most critical areas for smoke management are listed in the manual reference above. One other area where smoke

sensitivity is high is in and around the Class I airsheds. These airsheds are primarily wilderness areas designated prior to 1975 and lands administered by the National Park Service. Wilderness areas that have been established since 1975 are Class II airsheds. This means that wilderness areas on Bureau administered lands are Class II airsheds.

The Arizona Department of Environmental Quality has issued Interim Operating Guidance For Smoke Management In Arizona. Prescribed natural fires in wilderness areas are subject to requirements identified in this interim guidance. Items to be addressed in the wilderness fire management plan include:

a. How prescribed natural fires will be pre-registered with Arizona Department of Environmental Quality.

b. How daily notification to ADEQ will be accomplished.

c. How smoke will be monitored on prescribed natural fires.

d. A map showing smoke plume projections should be prepared. A suggested method for preparing a smoke plume projection map is as follows:

Using a red marker for the daytime period, draw a line downwind of the burn for a distance representing 60 miles. Draw a 30-degree vector on each side of this centerline. For a distance reference, strike and arc at the 20, 40, and 60 mile points. Identify any major roads, critical airsheds, communities, residences and other facilities inside this 60 mile arc. For the night time period use a blue marker to identify areas where smoke would concentrate at night. This should reflect the shift to down-canyon winds experienced at night, and could be a 180-degree turn from the daytime smoke plume projection. Identify any major roads, critical airsheds, communities, residences and other facilities inside this area.

e. A section on Potential Best Management Practices (BMP's) has been developed by ADEQ. These BMP's should be reviewed and incorporated into this section as practical.

A complete review of any new guidance produced by ADEQ should be accomplished and incorporated into this section as it becomes available.

10. Prescribed Burning.

Prescribed fires ignited by Bureau personnel may be allowed on a case-by-case basis for the following purposes:

a. To reintroduce or maintain the natural condition of a fire-dependent ecosystem.

b. To restore fire where past strict fire control measures had interfered with natural ecological processes.

c. Where a primary value of a given wilderness will be perpetuated as a result of the burning.

d. Where it will perpetuate a threatened or endangered species.

This section is used to identify the need for any type of prescribed burning where ignition will be made by Bureau personnel in the wilderness area. The purpose of and need for the prescribed fire should be outlined here. Any burning for reasons other than those listed above will not be allowed within a wilderness area.

A site specific burn plan (operational plan) and EA will be prepared for all prescribed fires within a wilderness area that are ignited by Bureau personnel. These plans must receive review from the next higher organizational level than where they were prepared but are approved by the District Manager.

11. Rehabilitation.

Two levels of rehabilitation need to be considered in the plan. The first is rehabilitation of impacts incurred in the suppression effort itself. How evidence of fire control activities will be removed should be discussed. Temporary fire camps, helispots, and other sites used for fire suppression or control activities must be removed upon completion of use and the site rehabilitated to as natural a state as possible. This includes the flagging used to mark trails into the fire. The second is the rehabilitation due to damage caused by the fire. Planned rehabilitation methods, techniques, or requirements should be identified in this section.

If any Rehabilitation Plans are in place that pertain to the wilderness area, they should be mentioned in this section.

12. Illustrations.

a. Decision matrix. The decision matrix is a very important part of the wilderness fire management plan. The Decision matrix, in conjunction with the wilderness fire management plan itself, ensures that all necessary factors that require consideration are addressed, prior to the determination that a fire will be designated a prescribed natural fire. The decision matrix is the planning prescription for the wilderness area. The Decision Matrix also gives the District Manager a document with which to daily recertify that the fire is doing what it is supposed to be doing. Example 4 illustrates how a decision matrix may be organized. The example matrix shows the minimum criteria to be used in the matrix. More criteria may be added.

b. Maps. A map or maps showing the location of vegetation boundaries, structures, access, potential helispots, hazards, buffer zones, etc. should be included as an appendix to the plan. The map should extend beyond the wilderness area boundary and identify anything that could be adversely affected by a fire that could escape the wilderness boundary.

Example 4 - DECISION MATRIX

ITEM	ANSWER	ACTION
Life or Property Threatened	(yes)	Suppress
	(no)	
Boundary Threatened	(yes)	Suppress
	(no)	
Number of Prescribed Burns <__	(no)	Suppress
	(yes)	
Smoke Management Favorable	(no)	Suppress
	(yes)	
Prescription Criteria or ERC	(no)	Suppress
	(yes)	
Current Weather Forecast Favorable	(no)	Suppress
	(yes)	
Current Fire Behavior Favorable	(no)	Suppress
	(yes)	
Ten Day Forecast Favorable	(no)	Suppress
	(yes)	
Equipment/Personnel Available	(no)	Suppress
	(yes)	
Fire Meeting Objectives	(no)	Suppress
	(yes)	
Fire is <__ ac.in size	(no)	Suppress
	(yes)	
MONITOR FIRE		

APPENDIX 1 - FUNDING NATURAL PRESCRIBED FIRES.

Funding for prescribed natural fires is one of the most critical factors in the determination to designate a fire as a prescribed natural fire. All involved need to know up front that there will be costs involved with this decision. Who pays these costs must also be determined up front. The benefitting activity is responsible for funding any type of prescribed fire. With prescribed natural fires many different activities may be benefiting at the same time from the same fire. It is extremely difficult to plan money for an unplanned event. One thing that is certain is that there can not be a prescribed fire unless there is money available to fund it. One option is to develop a "pool" of money from the different programs that could benefit from a prescribed natural fire that can be used in the event an opportunity presents itself to allow a fire to burn. If it appears that there are going to be no opportunities to have a prescribed natural fire, this money could be used elsewhere in the district before the end of the fiscal year. In the case that no money is available to fund a prescribed natural fire, suppression will take place.

Most people think of an unlimited check account when they think of fire funding. They also envision huge amounts of money being spent when a fire is being suppressed. This thought process carries over into the thought of prescribed natural fire. There should be time to assess the fire, develop a perimeter, and monitor the fire without throwing vast amounts of resources and money into the effort.

The establishment of a perimeter helps clear up the funding picture very effectively. The benefitting activity pays all costs associated with the monitoring of the fire within the perimeter and the cost of any perimeter construction itself. Fire suppression funding will be used if and when the fire escapes the perimeter or if conditions change and it is determined (using the decision matrix) that the fire must be extinguished.

Fire suppression accounts will not be used to finance any prescribed natural fire. This money is allocated by Congress to fund fire suppression only.

APPENDIX 2 - RESOURCE ADVISORS.

Resource Advisors should be included as an integral part of the fire suppression team. The Resource Advisor should be assigned to any fire that escapes initial attack. The primary job of the Resource Advisor includes:

1. Provide guidance to the Incident Commander on wilderness values that may be threatened by the fire.

2. Provide guidance to the Incident Commander on the suppression methods that may be used in the wilderness area.

3. Act as a liaison between the Incident Team and the District Management Team.

4. Assist in the preparation and review of the Escaped Fire Situation Analysis.

5. Assist in the development of the rehabilitation plan if one needs to be developed.

The Resource Advisor should be a person who is very knowledgeable with the particular wilderness area and the wilderness management plan. The Resource Advisor should also be familiar with fire suppression tactics, behavior, and equipment in order to make sound recommendations to the Incident Commander. This also allows the Resource Advisor to adequately assess the impacts that different tactics or equipment will have on the wilderness resource.

When a wilderness fire is turned over to a Type I or Type II Overhead Team, the District Manager should, in the Delegation of Authority, spell out to the Incident Commander how the Resource Advisor is to be integrated with the fire team.

GLOSSARY

Burning Index (BI): A relative number related to the contribution that fire behavior makes to the amount of effort needed to contain a fire in a specified fuel type. Doubling the BI indicates twice the effort will be required to contain a fire in that fuel type as was previously required providing all other parameters are held constant.

Decision Matrix: A set of criteria developed to ensure that consideration of all important environmental and planning factors in a wilderness area are considered before a new fire is declared a prescribed natural fire. The decision matrix is also the vehicle with which the line manager can make a daily certification that the prescribed fire is burning within all predefined criteria.

Escaped Fire Situation Analysis (EFSA): Analysis of factors which influence suppression of an escaped fire from which a plan of attack will be developed; includes development of alternative strategies of fire suppression and net effect of each.

Environmental Prescription: That portion of the decision matrix which defines parameters such as temperature, relative humidities, fuel moisture, etc. which will be used in evaluating whether to allow a fire to be declared a prescribed natural fire.

Energy Release Component (ERC): The computed total heat released per unit area (BTU's per square foot) within the fire front at the head of a moving fire.

FIREDAT (Fire Data Manipulation Program): Computerized planning tool used to determine the relative efficiency of fire protection measures by normalizing fire weather across the years being compared; one of three routines in the Fire Family program.

Fire Family (Fire Data Program): Fort Collins Computer Center (FCCC) based statistical analysis program, fed by the National Fire Weather Library and capable of reproducing National Fire Danger Rating System (NFDRS) components and indices currently in use for locations which kept data, converting historical weather to the current system. This provides a direct comparison of the NFDRS now with what it would have been if NFDRS had existed at the time the weather data were collected.

FIRINF: One of three routines in the Fire Family program. This program (along with SEASON; another of the routines in Fire Family) will re-read data

created by FIREDAT and organize it into probabilities, seasonal graphs, calendars, and other fire management tools.

Incident Commander (IC): Individual responsible for the management of all incident (fire) operations.

Planning Prescription: A set of criteria developed for the wilderness fire management plan that is used primarily as a decision tool. It includes all the components of the decision matrix except for those elements defined as the environmental prescription. The planning prescription considers factors such as number of fires burning, smoke management, fire management objectives, personnel availability, etc..

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